

Serial No: 10/795,844

Amendment A dated December 11, 2008

Response to Office Action dated September 22, 2008

Remarks

Reconsideration and allowance of this application is respectfully requested.

Claims 1-, 56, 58, 59, and 61-64 are pending and at issue in the present application, claims 57 and 60 being cancelled herein and claims 63 and 64 being newly presented herein.

Claims 1-36, 38, 39, 41-49, and 52-61 stand rejected as anticipated by Williams (U.S. Patent No. 6,314,311), claim 40 stands rejected as obvious over Williams in view of Swindler (U.S. Patent No. 5,424,913), and claims 37, 51, and 62 stand rejected over Williams in view of Cambier (U.S. Patent No. 5,159,361).

Claim 19 has been objected to for missing an ultimate period. The amendments presented herein correct this informality. Withdrawal of the objection is requested.

Support for the amendments to claims 1, 3, 41, 44, 51, 52, and 61, and new claims 63 and 64, can be found at least at paragraphs 0019, 0020, 0026, 0029, 0030, 0031, and Figures 4-8.

Applicants traverse the rejections of claims 1-59, 61, and 62 as either anticipated by or obvious over any of the applied references.

Specifically, none of the applied references discloses or suggests a light source as recited in claim 1, and claims 2-40 dependent directly or indirectly thereon, wherein an input device associated with a light projector sends signals to the light projector that cause the light projector simultaneously to project data light along with illumination light to the field of interest, and wherein the illumination light comprises adequate ambient illumination light for viewing the field of interest during a procedure, and the data light is brighter than the ambient illumination light.

Further, none of the applied references discloses or suggests a light source to illuminate a field of interest, as recited in claim 40 and claims 42-51 dependent directly or indirectly thereon, including an illumination module comprising a series of digital light projectors capable of projecting illumination light to the field of interest adequate for viewing the field of interest during a procedure, and an input device associated with the illumination module, wherein the input device sends signals to the illumination module that cause the illumination module simultaneously to project data light along with the illumination light to the field of interest, and wherein the data light shows procedure plan information and instrument guidance information for conformance with the procedure plan.

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Further still, none of the applied references discloses or suggests a method of providing light to a field of interest during a procedure, as recited in claim 52 and claims 53-59, 61, and 62 dependent directly or indirectly thereon, including the step of indicating a direction to move an instrument during the procedure in the field of interest using the projected data.

In addition to the deficiencies pointed out above in the independent claims, the applied references do not disclose or suggest any of the following features as recited in the indicated dependent claims:

that the data light displays the location of an instrument relative to a point within the field of interest (claim 2), pre-operative surgical procedure plan information and intra-operative tool guidance information on the field of interest (claim 3), a surgical approach (claim 13), information about the location of an instrument relative to the surgical approach (claim 14), information relating to life support systems and parameters (claim 19), data from a surgical navigation system (claim 25), information specific to a particular surgical instrument being used (claim 26), or data from a surgical navigation system (claim 45);

a surface scanning module (claim 5) that includes a camera system to facilitate video optical scanning and localization of objects based on the scan information (claim 6) or a video camera to facilitate video-optical scanning (claim 7);

that the support structure is either remotely controlled (claim 31), or adapted automatically to achieve best line of sight or perpendicular light projection rays (claim 32);

that the data light is projected onto a reflective surface associated with the surgical field (claim 34); or

that the data light is calibrated by stereophotogrammetry using a calibration pattern (claims 37 and 50).

In fact, Williams discloses an image guided surgery system that allegedly "provides a ... registration technique," wherein images of a patient from a pre-operative scan, such as an MRI or CT scan, are projected onto the body of a patient in order to allow visual registration of the real space of the patient with the image of the pre-operative scan. (See, Williams, 4:6-22). "The registration system 200 ... depicts on the subject 310 a selected image representation ... of the subject's anatomy." (Williams, 4:6-9). Thus, "the orientation and position of the subject 310 and the depicted image [of the patient's anatomy] are adjusted relative to one another such that

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the like regions of anatomy coincide." (Williams, 4:12-14). In order to accomplish this registration, Williams discloses using a projector 230 to project the pre-operatively obtained image of the patient's body back onto the patient's body during the surgical procedure and then matching the projected image to actual points on the patient's body.

At no point, however, does Williams disclose or suggest using the projector 230 to simultaneously project both adequate ambient illumination light for viewing the field of interest during the surgical procedure and data light that is brighter than the ambient illumination light.

Further, Williams does not disclose or suggest that the projected image shows any procedure plan information or instrument guidance information for conformance with the procedure plan.

Further still, Williams does not disclose or suggest that the projected image ever indicates a direction to move an instrument during the procedure in the field of interest.

With respect to independent claims 1, 41, and 52, the Office action argues that "the input device (Figure 2, Element 220) [is] capable of sending signals to the light projector such that the light projector simultaneously projects data light along with the illumination light to the field of interest (Col. 5, Line 59-64)" (O.A. at page 2). However, whether the projector 230 is simply capable of simultaneously projecting data light and illumination light is not opposite to the claims as recited. In fact, Williams only discloses that the projector system projects image data from the pre-operative scan images of the patient without simultaneously projecting ambient illumination light for providing general illumination of the surgical area sufficient for the surgeon to view the surgical area. For at least these reasons, the rejections of independent claims 1, 41, and 52 are improper and should be withdrawn.

With respect to dependent claims 2, 13, 14, 25, 26, and 45, the Office action alleges that "Williams teaches the light source where the data light displays the location of an instrument relative to a point within the field of interest relative to the surgical approach (Col. 6, Line 30-37)." (O.A. at page 2). Aside from the fact that the stated rejection does not even address all of the recited claim features in the discussed claims, the undersigned respectfully disagrees with this allegation by the examiner. In fact, Williams teaches at column 6, lines 30-37 that "[a]s the needle biopsy is being performed, images of interior planes perpendicular to the trajectory of a biopsy needle are projected onto the subject 310" This statement, however, simply

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indicates that the images of the patient's body acquired from the pre-operative scan are projected by the projector 230. This statement does not disclose or even suggest that the projector 230 is projecting an image of the instrument, or for that matter any other procedure planning information, such as a planned target point, planned instrument trajectory, or any navigational information. Rather, as previously stated above, Williams only discloses projecting the image of the patient onto the surgical area. Therefore, for these additional reasons, the rejections of claims 2, 13, 14, 25, 26, and 45 are improper and should be withdrawn.

With respect to dependent claims 5-7, the Office action alleges that "Williams teaches ... the light source that includes a surface scanning module (Figure 3, Element 400)," and that "Williams teaches the light source wherein the surface scanning module includes a camera system to facilitate video optical scanning and localization of objects based on the scan information (Col. 6, Line 49-53.)" (O.A. at page 3). The undersigned respectfully disagrees with this allegation by the examiner. In fact, Williams teaches at column 6, lines 49-53 and in Figure 3 a conventional optical navigation system that can include CCD arrays for tracking emitters that transmit a point signal for detection by the CCD arrays, whereby the navigation system can track the projector 230 or surgical tool by receiving the point signals from the emitters and display the spatial relationships of the various components on a display screen that is outside of the field of interest. Therefore, for these additional reasons, the rejections of claims 5-7 are improper and should be withdrawn.

With respect to claim 19, the Office action alleges that "Williams teaches the light source where the data light displays physiological data (Col. 6, Line 17-27) also includes respiration rate (Col. 6, Line 26-27)." (O.A. at page 3). The undersigned respectfully disagrees with this assertion. In fact, Williams teaches that the projected image of the patient may be cycled among a number of different images of the patient at different stages in the patient's respiratory cycle in order to match the projected image with the actual body of the patient. This projected image, however, does not include any other projected data other than the various images of the patient's body, and certainly does not display any information relating to life support systems and parameters. Therefore, for these additional reasons, the rejection of claim 19 is improper and should be withdrawn.

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With respect to claims 31 and 32, the Office action alleges that "Williams teaches the light source that includes an adjustable support structure with automatic or remote control (Col. 6, Line 60- col. 7, Line 3)." (O.A. at page 4). Again, the undersigned respectfully traverses the rejection because Williams actually only discloses that "processor 430 determines appropriate corrections to be applied to the selected image" and that "the image being projected is depicted in the proper size and rotation on the region of interest on the subject 310." (Williams, 6:61-7:1). Williams further explains that the correction to the image "eliminates manual adjustment of the projector 230 or the subject 310 . . ." (Williams, 7:2-3). Thus, directly contrary to the assertion of the examiner, Williams actually eliminates any need to adjust the support structure of the projector 230 at all, and certainly does not disclose or suggest "automatic or remote control" adjustment of the support structure as alleged by the examiner. Therefore, for these additional reasons, the rejections of claims 31 and 32 are improper and should be withdrawn.

Regarding claim 34, the Office action alleges that Williams teaches that "the light is projected onto a reflective surface associated with a surgical field (Col. 5, Line 13-17.)" (O.A. at page 4). The undersigned respectfully disagrees with this assertion. Rather, Williams actually teaches that "the projector 230 is a laser light show projector" that includes a deflector 238, and that "the deflector 238 preferably comprises one or more motor driven mirrors . . . [or] . . . is a combination of reflective surfaces and/or lens elements that selectively redirect the beam of low-power laser light 236 as desired for the projection 232 being performed." (Williams, 5:5-17). Thus, the only reflective surfaces disclosed or suggested by Williams are the mirrors that are associated with the projector itself, not with the surgical field. Therefore, for these additional reasons, the rejection of claim 34 is improper and should be withdrawn.

Neither Swindler nor Cambier overcome the deficiencies pointed out in Williams.

Swindler discloses a laptop computer and associated components, but is not alleged by the examiner to disclose any of the deficiencies pointed out herein-above.

Cambier discloses a computerized system for obtaining topographic information about a surface, such as a cornea, wherein a pattern of alternating light and dark lines are projected onto the surface, a camera records the reflected image of the pattern, and a computer processes the reflected image using known stereophotogrammetric techniques to determine the topographic

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contours of the surface by comparing distortions in the reflected image with the known projected pattern.

The proposed modification of Williams with the topographic detection system disclosed in Cambier, does not present a *prima facie* case for obviousness of claims 37, 50, and 62, as alleged in the Office action. Specifically, the Office action alleges that "Cambier teaches the light source wherein the data light is calibrated by stereophotogrammetry using a calibration pattern (Col. 39, Line 10-20) to correct distortions (Col. 40, Line 40-46)." (O.A. at page 6). The undersigned respectfully urges that this assertion is incorrect. In fact, Cambier teaches at columns 40 and 41 a method of calculating three-dimensional topography of the corneal surface by viewing reflected light from the surface and then calculating the topographic surface using known stereophotogrammetric techniques. (Cambier, 38:40-40:68). Corrections for distortions in the viewed reflected light vectors caused by the camera are calculated using pre-determined distortion coefficients. (Cambier, 40:40-46). The only calibration that is disclosed by the portions of Cambier relied upon by the examiner are calibrations to the calculations of the topographic contours of the cornea; however, the calibrations discussed in Cambier are not applied to the projection of the grid image itself. Rather, the projected grid image is maintained at a known, constant value and does not need any correction applied to it. Therefore, because Cambier does not disclose or suggest that the data light is calibrated by stereophotogrammetry, as recited variously by claims 37, 50, or calibrating the data light projection using stereophotogrammetry as recited in claim 62, the reasoning underpinning the pending rejections of claims 37, 50, and 62 is improper and the rejections thereof should be withdrawn.

For the above-indicated reasons, it is believed that the pending claims are now in condition for allowance. Reconsideration and withdrawal of the pending rejections and allowance of the claims at issue are respectfully requested.

Request for Interview

The undersigned requests the courtesy of a telephonic interview with the examiner and/or the examiner's Supervisory Patent Examiner to discuss the amendments and arguments presented herein for the purpose of expediting this prosecution by attempting to reach early agreement on allowable claims.

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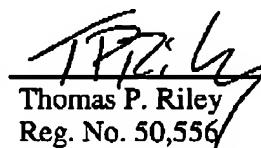
Deposit Account Authorization

The Commissioner is hereby authorized to charge any deficiency in any amount enclosed or any additional fees which may be required during the pendency of this application under 37 CFR 1.16 or 1.17, except issue fees, to Deposit Account No. 50-1903.

Respectfully submitted,

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